THERM CONCEPT

THERMPROZESS-TECHNOLOGY

CFRP/GFRP
FIBRE COMPOSITES
ELASTOMERS
POLYAMID/POLYCARBONATE
SILICONE
EN 1539

Furnaces and thermal engineering systems up to 450 °C for

DRYING | CURING AND POST-CURING | COATING
TEMPERING | HEATING | POLYMERISING | IMPREGNATING
LACQUER DRYING | LAMINATING | SHRINKING | VULCANISING
DEGASSING | CROSS-LINKING

THERMCONCEPT

High-performance furnaces for industrial heat treatment processes

High-precision heat treatment processes play a decisive role in the creation of innovative products. Components must be dried, hardened, impregnated, tempered and degassed in order to achieve the desired product properties. This includes, for example, polymerisation processes in the production of fibre composites as well as the impregnation of coatings on windings of electric motors and transformers or the curing and post-vulcanisation of elastomers.

The demands placed on the furnace systems required are high: precise and controlled temperature control, an air flow in the furnace chamber that is individually adapted to the components, the use of vacuum units, sophisticated safety technology, integrated exhaust gas cleaning systems, digital monitoring units and documentation systems.

THERMCONCEPT has decades of experience in the development, design and manufacture of high-performance furnaces and systems for industrial drying processes for many products, components and parts made of plastics, fibre composites, elastomers, etc., which are used in automotive engineering, aviation and many other industrial sectors. Our innovative engineering results in strong products for the highest demands.

Engineering

Our highly qualified development engineers and designers, hardware and software professionals, technicians and mechanics develop cost-effective and reliable furnace solutions. Our close proximity to the user enables us to design practice-orientated furnaces. Our aim is to provide you with the decisive technical and economic advantage.

Flexibility and speed

Many applications can be solved with our standard furnace range. The advantages for you: tried and tested models, excellent value for money, short delivery times. Of course, we can also supply you with a furnace system specially customised to your application. In close co-operation with you, we will create a furnace system that will enable you to solve your demanding tasks reliably and economically.

Automation and Industry 4.0

The need for automation in all areas of production is constantly increasing. THERMCONCEPT supplements furnace systems with customised systems for batch movement. We are just as familiar with linear handling as we are with robot-supported systems.

We use sophisticated software and hardware components to monitor, control and regulate the heat treatment processes. Machine communication and technical assistance worldwide is part of our service profile.

Global Sales and Service Network

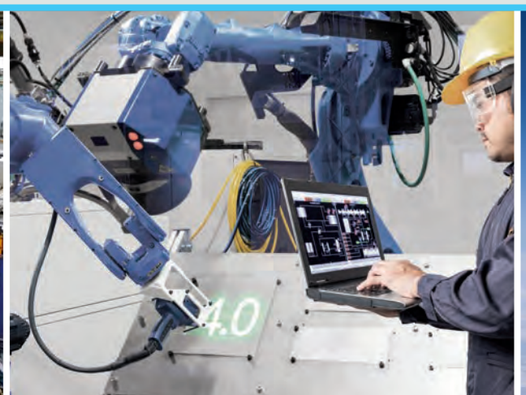
THERMCONCEPT furnaces and systems prove themselves in daily use with satisfied customers in many countries around the world. Our international sales network guarantees our customers personalised support, fast response times and qualified service on site.

THERMCONCEPT *powered by innovation*

THERMCONCEPT high-performance furnaces and industrial heat treatment systems stand for:

- TOP quality and sophisticated technology
- Practical and service-friendly constructions
- customized and application-oriented solutions
- Maximum heat efficiency and economy
- Environmentally friendly materials
- Professional service and system support for ensuring reliable operation

THERMCONCEPT is your partner when it comes to high-performance furnaces and systems for diverse and demanding applications in production and research.



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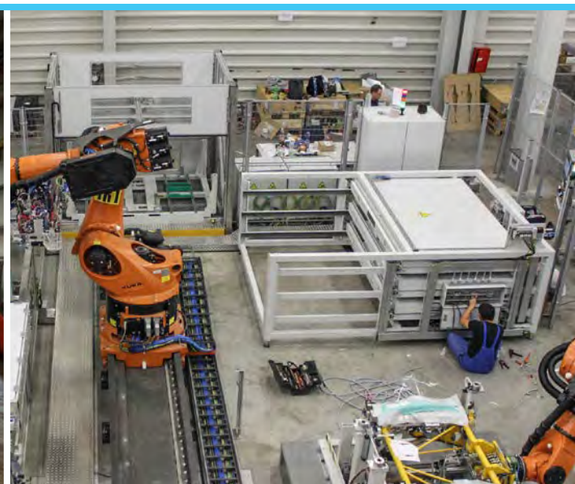
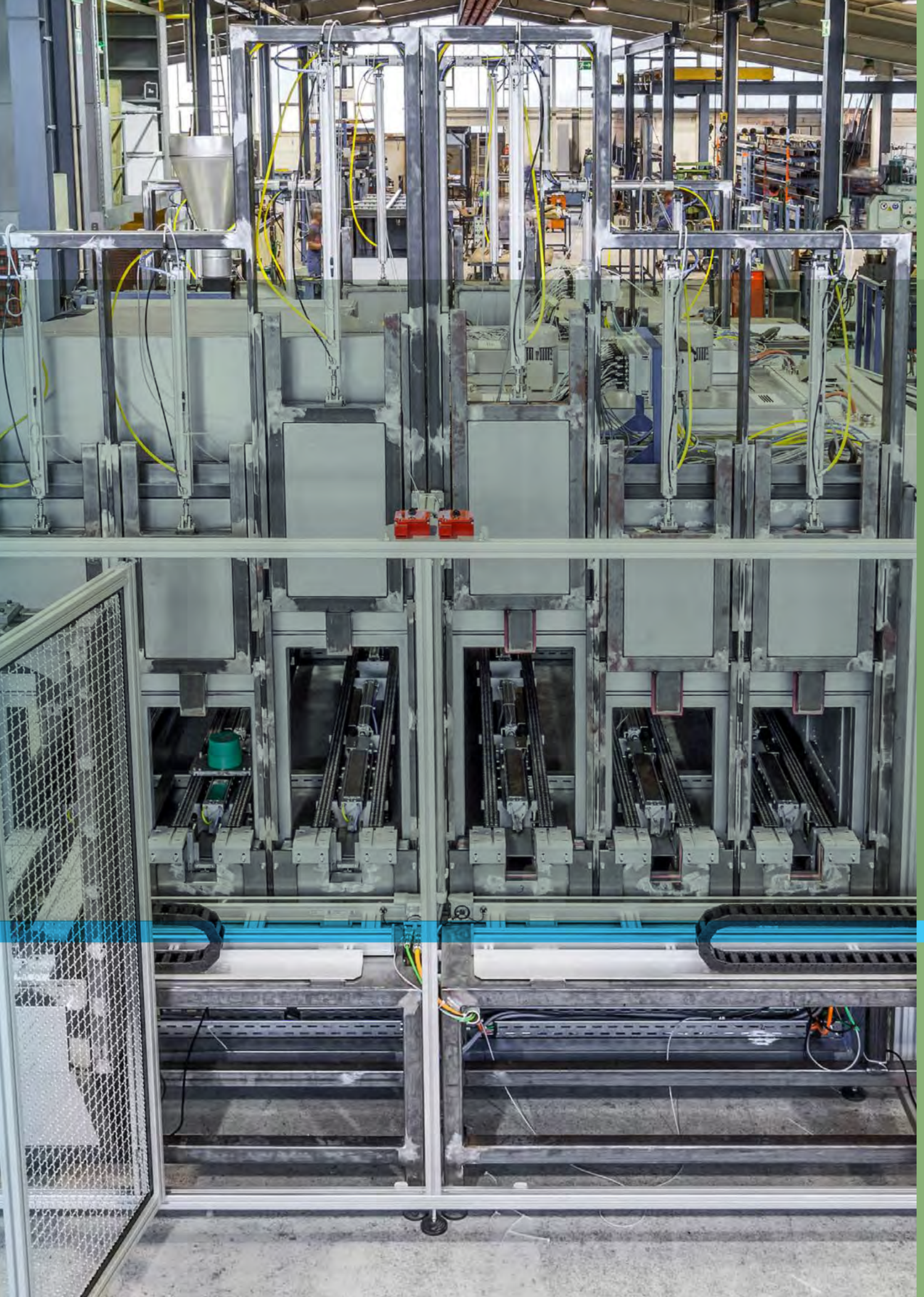




THERMCONCEPT

High-performance furnaces in industrial use

THERMCONCEPT

Diversity in furnace construction

Industrial applications

for THERCONCEPT furnace systems

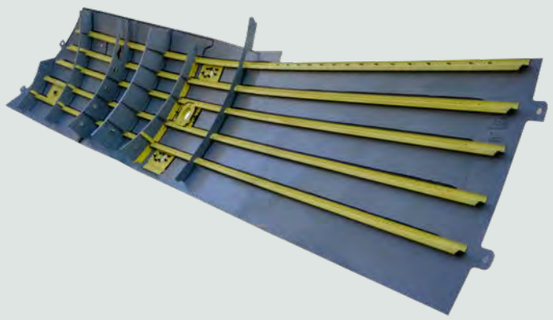
Diversity in furnace construction

The areas of application for industrial drying systems are diverse. THERMCONCEPT supplies a comprehensive range of low-temperature furnaces of various designs. In addition to the classic chamber kiln, drawer kilns, chest kilns and kiln systems with retractable trolleys are also used. Continuous furnaces with horizontal or vertical transport of the components are available for continuous processes. THERMCONCEPT industrial furnaces offer a wide range of heating options:

- Electricity
- Gas
- Superheated steam
- Thermal oil

Aircraft construction

THERMCONCEPT supplies furnace systems for the production of structural parts and components for aircraft construction, e.g. for the polymerisation of fibre composite materials.



Industrial applications

for THERCONCEPT furnace systems

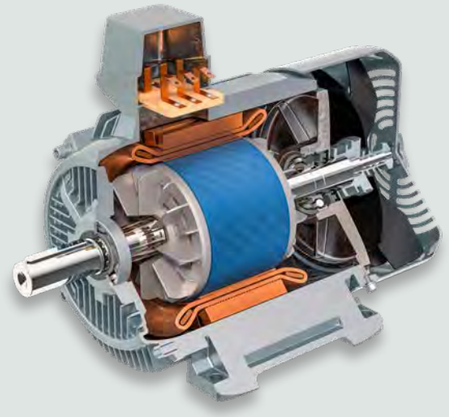
Automotive

Lightweight construction remains a supreme discipline in vehicle construction. The use of high-performance fibre composites opens up further efficiency potential and enables the development of alternative vehicle concepts. THERMCONCEPT furnaces are a component of many fibre composite production systems in the automotive industry.

Furnace systems for the heat treatment of elastomers, e.g. post-vulcanisation of hose lines, seals, rubber buffers, shock absorber bearings, protective sleeves, sleeves, cable grommets, etc.

Furnace systems for the heat treatment of polyamide parts and polycarbonate components, such as gearboxes, hose lines, lamp housings, friction linings and special seals.

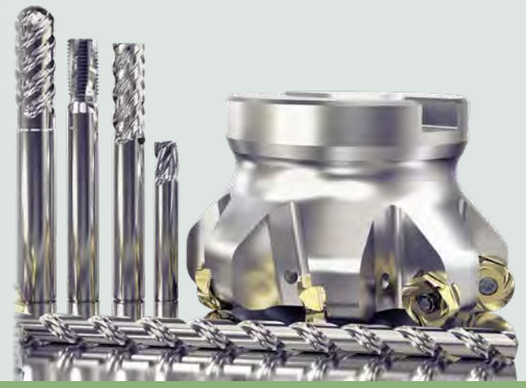
Electrical industry



Furnace systems for drying and polymerising impregnating varnishes, potting compounds, coating varnishes on windings of electric motors, stator and rotor windings, coils and transformers.

Toolmaking

To improve the component properties of steel components, the substances dissolved in the component or trapped as bubbles must be removed. Degassing or dehydration prevents, for example, hydrogen embrittlement of steel or corrosion. THERMCONCEPT supplies furnace systems for the thermal degassing of high-quality components.



Industrial applications

for THERCONCEPT furnace systems

Plastics industry

THERMCONCEPT furnaces can be used for a wide range of applications in the plastics industry. These include curing processes for elastomers such as hose lines, seals, rubber buffers, protective sleeves, etc. as well as furnace systems for curing and preheating polyurethane and polycarbonate products prior to moulding.

Wind turbines

Wind turbines are by far the most important form of wind energy utilisation today. Rotor blades and other highly stressed components such as webs, spars and cladding are usually made of glass fibre reinforced plastic (GFRP). Carbon fibres are also increasingly being used for long rotor blades. The heat treatment of the components used is a central component in the production of high-performance wind turbines.

Mobility

Components made from fibre composites are used in the construction of rail vehicles with the aim of increasing efficiency by reducing weight. Vehicle control centres, cockpits, floor and underbody panels, doors, roofs, interior panelling, etc. are made from composite materials. THERMCONCEPT furnace systems are also used for very large components and can be equipped with vacuum technology for infusion and compression processes.

Acrylic glass

The fields of application for acrylic glass are diverse. Acrylic glass is used in construction, automotive engineering, the aerospace industry, the semiconductor industry, lighting technology, optics and medical technology. The central processing step in the manufacture of acrylic glass products is always heat treatment. THERMCONCEPT convection furnaces in various designs are used here.

Sports and Leisure

CF bicycle rims and frames, helmets and protectors, rowing blades, skis and snowboards, boat hulls, tennis and ice hockey rackets, surfboards - these are just a few examples of applications for THERMCONCEPT furnace systems.

Chamber furnaces

Customised furnace sizes | Individual charging solutions

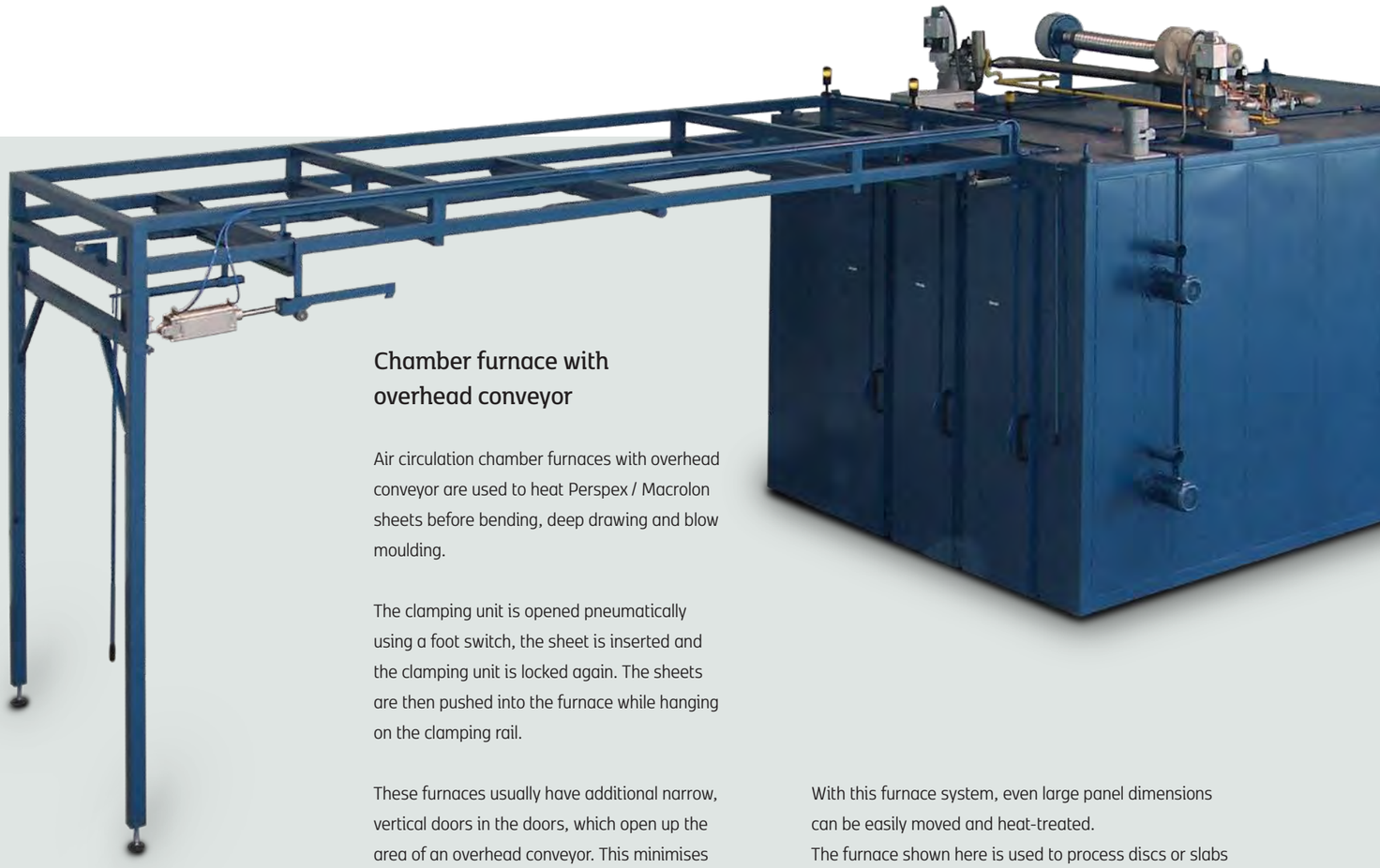
DIN EN 1539 for solvents | Stainless steel inside/outside

Cooling function | Hinged or lifting door with or without viewing window

Chamber furnaces

with drive-in trolley

Chamber furnace for curing coatings, equipped with two retractable trolleys and hot air extraction above the door.



Chamber furnace with overhead conveyor

Air circulation chamber furnaces with overhead conveyor are used to heat Perspex / Macrolon sheets before bending, deep drawing and blow moulding.

The clamping unit is opened pneumatically using a foot switch, the sheet is inserted and the clamping unit is locked again. The sheets are then pushed into the furnace while hanging on the clamping rail.

These furnaces usually have additional narrow, vertical doors in the doors, which open up the area of an overhead conveyor. This minimises heat and time loss during charging.

With this furnace system, even large panel dimensions can be easily moved and heat-treated.
The furnace shown here is used to process discs or slabs measuring 4.2 m x 2.5 m and weighing around 110 kg.

TECHNISCHE DATEN

Picture right:
Furnaces without floor insulation are loaded at ground level. Furnaces with floor insulation are recessed into the hall floor for this purpose or alternatively have adapted entry lanes or a folding ramp.

Picture right:
Chamber kiln system with indirect gas heating and high-precision air flow in the kiln chambers for tempering large-format structural components made of composites at temperatures of up to 200 °C. Consisting of 3 indirect gas-heated chamber furnaces for drying, ground-level loading with standard shelf trolleys.

Chamber furnace

for CFRP/GFRP roll production

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Furnace system for tempering CFRP/GFRP rolls with a length of up to 14,500 mm. The furnace is loaded and unloaded automatically via a linear charging system with a rotating mechanism. This ensures that the rolls are permanently rotated from the moment they are transferred to the charging system and during loading and tempering in the furnace.

Loading takes place via a 16 metre wide and 2.1 metre high lifting door. The furnace is designed for a max. temperature of 310 °C and is divided into 4 heating zones.

Tempering furnace

for processes under vacuum

Large-volume structural components for high-speed trains made from innovative composites are tempered at temperatures of up to 250 °C in the electrically heated chamber furnace with a volume of 84 m³.

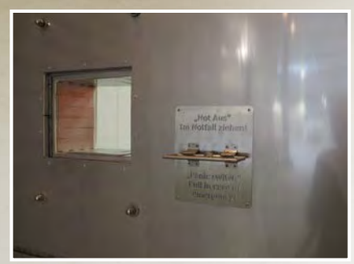
The furnace system has door openings at the front and rear and acts as an airlock between two production areas; tempered components are transported into a shielded, clean section of the hall.

Plug-in rails are provided in the furnace floor for the safe entry of large charging trolleys at ground level without rails, various smaller components can also be placed individually in the furnace.

Several vacuum clusters with a powerful vacuum pump station are also part of the system, as are various thermocouple slots for temperature recording on the component.

The temperature in the furnace chamber is controlled via 6 zones and enables excellent temperature uniformity of ± 2 °C in the entire usable space in accordance with DIN 17052.

The system control via a Siemens PLC S7 with touch panel offers various options for data tracking and data archiving.



Tempering furnaces

for plastics

Furnace systems for tempering FRP components (fibre-reinforced plastics) at temperatures of up to 300 °C. The heat-treated CFRP/GFRP components are used in aviation, marine technology, racing and mechanical engineering.

Chamber furnaces

with lifting doors

The furnace systems are used for tempering high-performance components for the racing and aerospace industries. In order to utilise the limits of the material properties, both precise process control and comprehensive documentation of the processes are necessary.

The furnace systems have feed-through for vacuum and pressure as well as for measuring lines. The system control and process documentation comply with international standards in accordance with CQI-9 or AMS 2750.

Motorised lifting doors save space in front of the furnace, making it easy to work and manoeuvre for loading and unloading without the inconvenience of swinging doors in front of the furnace chamber.

Tempering furnaces

for the aviation industry

The chamber furnace is used for tempering large-format CFRP/GFRP components for the aircraft industry. With internal dimensions of 5 m wide, 10 m deep and 2.5 m high, the furnace has a chamber volume of 125 m³. The temperature uniformity is ± 3 °C in accordance with DIN 17052.

The system has 36 vacuum connections with pump stand and 72 thermocouple inputs.

Batches are recognised using a barcode reader. A Siemens PLC with Siemens WinCC Control software is used for process control and monitoring with various options for data tracking and data archiving.

Silicone furnaces

Customised furnace sizes | Individual charging solutions
DIN EN 1539 for solvents | Stainless steel inside/outside
Swing or lift door with or without viewing window

Silicone furnace

with rotating drum

Silicone components are tempered to improve their mechanical properties and to remove volatile components. In many cases, this is essential to comply with legal requirements, especially for components that come into contact with foodstuffs.

Air circulation furnaces for silicone tempering processes require a monitored supply of fresh air, as the volatile components consist mainly of flammable, low-molecular silicone compounds and possibly peroxide fission products, which must be removed from the furnace during the tempering process.

To ensure safe operation, the explosion limits must be observed and a fresh air flow rate of 100 – 120 l/min/kg silicone is required to avoid any risk of deflagration. Most of the volatile components escape during the first few hours of the process. The fresh air flow must be monitored during the entire tempering time.

During the tempering process, the components should be positioned as contact-free as possible - or, in the case of bulk material, they should be “tumbled” to prevent sticking and deformation and at the same time ensure the supply of fresh air to all parts. The decisive factor for determining the tempering time is ultimately the weight loss of the parts of around 2 h tempering time per 1 mm layer thickness.

Chamber furnace with removable rotary drum

The convection chamber furnace is specially designed for tempering silicone bulk goods. The bulk material must be moved to prevent it from sticking together. This movement takes place via a rotary drum, which can be moved out of the furnace for loading and unloading. The rotary drive is attached to the rear wall of the furnace. The maximum load is 100 kg of silicone, a quantity to which the required safety and process equipment is adapted.

Here, the drums are removed manually. The drums are positioned underneath the injection moulding machine for loading. These drums weigh around 10 kg when loaded and contain a large number of small parts. Batch weight per drum approx. 4 – 5 kg.

Silicone furnace with stationary rotary drums

The rotary drums are permanently installed in this furnace system. Charging takes place at the open furnace door. This method of operation is preferred for bulk goods with smaller components and low batch volumes. The drum is opened manually. The drum is first positioned via the rotary drive to the “top front filling position” or to the “bottom front position” for unloading.

Silicone furnaces

Silicone furnace for continuous operation

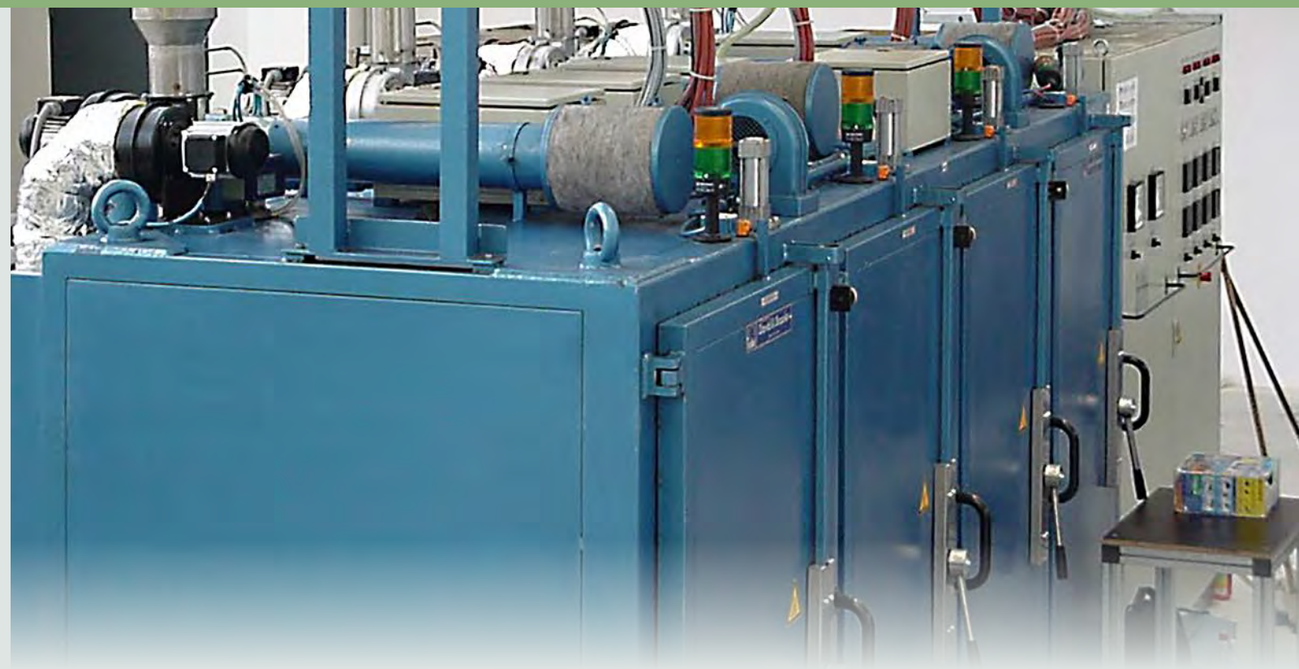
System for tempering silicone bulk materials using the fully automatic continuous flow principle, designed for 140 kg/h of silicone at 230 °C.

On the feed side of the system, 4 drums are always automatically conveyed in a row through a buffer to the furnace chamber. The 4 drums lie on transport trolleys, 4 transport trolleys form a unit that are moved together through the entire production process.

At the input point, the 4 drums are automatically transferred from the trolleys to the furnace conveyor system by a gripper. After being placed on the conveyor system, the drums rotate continuously in the furnace chamber and pass through it in 5 steps of 12 minutes each. After the last step in the kiln chamber, they are cooled in a separate cooling chamber that is separated from the hot zone.

After cooling, the 4 drums are automatically removed again by a gripper and transferred to the packaging position. An employee monitors the filling of the bulk material into the bags below. After emptying, the 4 drums are placed back on the transport trolley waiting below by means of a gripper. During the tempering process, these trolleys are channelled under the furnace chamber from the input side to the packaging station.

The process runs fully automatically, except for monitoring at the packaging stage. The large quantity of silicone requires a high fresh air throughput – a heat exchanger system with condensate trap is installed in the exhaust air / fresh air circuit to recover energy.



Chamber furnaces for ground-level charging

- Feeding via individual charging trolleys
- Furnace with run-in marks in the floor insulation

Top loading furnaces

Customised furnace sizes | Individual charging solutions
DIN EN 1539 for solvents | Stainless steel inside/outside
Cooling function

Top loading furnaces

in different designs

- Top loading furnaces with 2-part, manually operated hinged lids for side opening
- Lid with counterweight or with dampers for support

Production plant consisting of 4 top loading furnaces for drying and stoving paints.

Indirectly gas-heated top loading furnaces with horizontal air flow for tempering plastic-coated rolls for paper production.

Top loading furnaces with 3 separately controllable chambers for preheating components for shrink-fitting.

Single-chamber top loading furnaces for preheating aluminium profiles before bending.

Top loading furnaces

with turning device

- Top loading with a useful length of 32 m for the rotary tempering of rollers in fibre composite construction
- Rotation of the component to prevent resin dripping and one-sided sagging of the rollers
- The top loading is loaded with coiling bodies by crane
- The furnace floor is equipped with rails for moving the non-locating bearing blocks to accommodate winding elements of different lengths
- Rotation via sprocket / chain combinations or via plugged cardan shafts

Top loading with powerful rotating device

Extraction system on a chest furnace

Trolley furnaces

Customised furnace sizes | Individual charging solutions
DIN EN 1539 for solvents | Stainless steel inside/outside
Swing or lift door with or without viewing window
Cooling function

Trolley furnace

with turning device

The production plant consists of a total of 16 indirectly gas-heated or electrically heated trolley furnaces for drying paint on transformers. The furnaces each have a capacity of 18 m³.

The furnace systems are equipped with rotation devices. Each furnace has three rotating devices mounted at different heights so that transformers of different diameters can be inserted and tempered at the same time.

Trolley furnace

with turning device for tempering CFRP/GFRP winding bodies

Furnace for tempering fibre composite coiled bodies, rollers, shafts or containers. The rotation is performed to keep the resin matrix evenly distributed in the component. The sag due to the dead weight is reduced.

The furnace system shown here is loaded by crane. The length of the components can be up to 4 metres; an adjustable trestle also enables shorter components to be loaded.

Furnace system with lifting door and extendable trolley, all movements via electric drives.

Bogie hearth furnace for heavy loads

Continuous furnaces

Horizontal operation

Customised furnace sizes | Individual charging solutions

DIN EN 1539 for solvents | Stainless steel inside/outside

Cooling function

Continuous furnaces

for preheating

The furnace system is used to preheat gear wheels before pressing. The gears with the associated shafts and bearings are paired beforehand and are not separated when passing through the tempering system so that the pairings are retained. However, only the gears are heated. The wheels are checked for a minimum temperature of 170 °C using a pyrometer before leaving the furnace. Loading/unloading is carried out by a robot.

Continuous furnace with a length of 20 metres for tempering nano-coating on sanitary ceramics. The components are positioned on retractable trolleys. The batch trolleys are driven by a chain.

Continuous furnaces

with roller shutter

The continuous furnace is used for tempering CFRP aircraft components. The furnace is part of a production line. The assembly trolleys are guided into the furnace at the rear of the furnace via a transport device. Once heat treatment is complete, the assembly trolleys leave the furnace at the front for further processing. The furnace system has space-saving roller doors.

Continuous furnaces

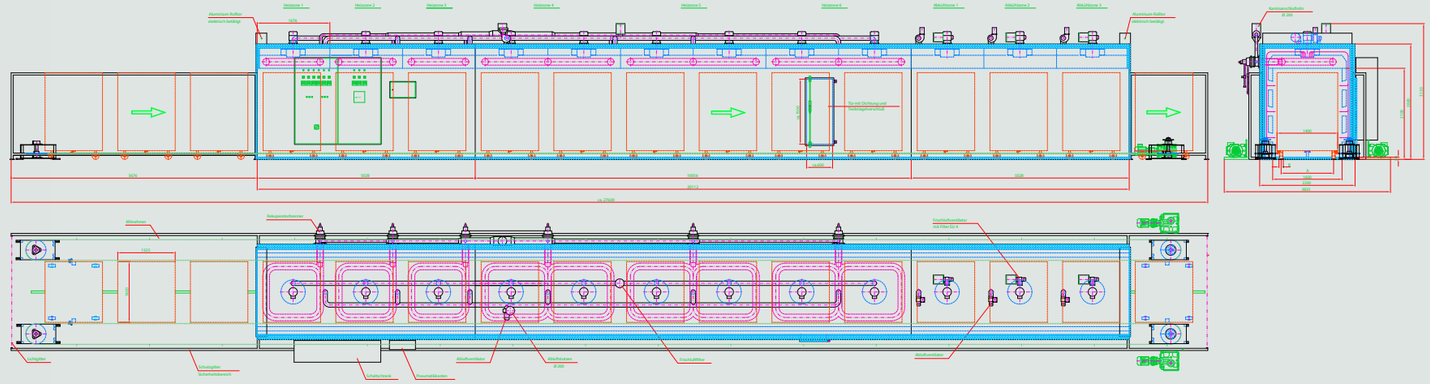
Continuous furnace for loading with standardised transport trolleys. The trolleys are fed manually into the furnace, while the movement inside the furnace and the discharging are cyclical and automatic. The number of trolleys in the tempering zone depends on the throughput. Different numbers of cycles and cycle times can be realised.

The system is equipped with a downstream cooling zone, which is automatically loaded during the cycle.

Cooling is possible with active recirculating air cooling or only through a fresh/exhaust air exchange.

Trolley weights up to 400 kg. Digital batch tracking with temperature data recording, optional network connection.

Furnaces with a length of more than 30 metres are in use here.



Continuous furnace

with workpiece carrier

Linear continuous furnace for fully automatic production with one workpiece per carrier. The furnace system is used for preheating processes before joining or for tempering potting for electric motors, stators and rotors. The part weight is 45 kg.

Continuous furnace

with three throughput sections

The furnace system has 3 continuous lines for heating, with accumulation conveyor and separator in the heating chamber and 3 return lines for cooling the parts as well as batch separation before the infeed on different lines according to product ID and the resulting required process.

The furnace system is used for preheating electric motors, stators and rotors before joining or for tempering potting. Fully automatic production with one workpiece on a carrier. Part weight 45 kg.

Head

X.X. Subhead

Continuous furnace

Large systems

This system is used in the automotive industry and consists of 4 sections, “loading zone”, “heating zone”, “cooling zone” and “unloading zone”. The batch baskets are loaded by means of a forklift in the loading zone at the beginning of the throughput section, up to 2 baskets on top of each other are possible. The drive unit consists of a total of 16 independently driven sections to enable fully automatic, independent movement of the individual baskets. This ensures that the system is fully utilised independently.

Basket weights of up to 500 kg and a total furnace load of 4 tonnes are possible, the total length is approx. 16 m.

After the tempering process, the batch is automatically transported to the cooling zone. It is then fed to the unloading zone and removed from the system manually using a forklift truck. The following batches are then prepared automatically in stages.

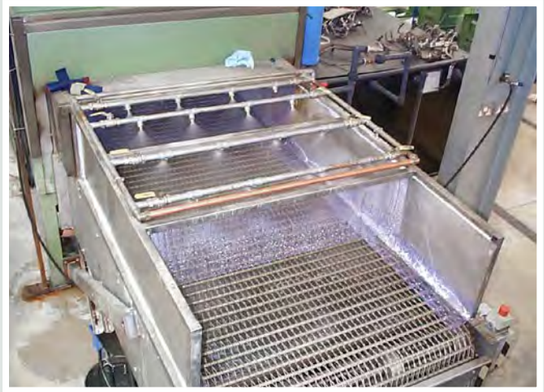
Continuous furnaces

Belt variants

Continuous furnace with air cooling and water quenching

Continuous furnace with air cooling zone, a water spray unit can be installed for quenching. Fully demineralised water is used to prevent lime-scale formation.

Furnace and metal mesh belt are made of stainless steel.



Continuous furnace for tempering plastic pipes

Furnace for tempering plastic pipes, unit weight approx. 300 kg. These pipes are rotated during tempering and also during the cycle feed. The support rollers are coated.

Various cross-member designs for defined flow onto the components.

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Variants of tapes

Right: Chain conveyor with cross plate struts, adapted to air flow and batch geometry.

Below: Chain conveyor with round cross struts, silicone or plastic-coated to protect the load.

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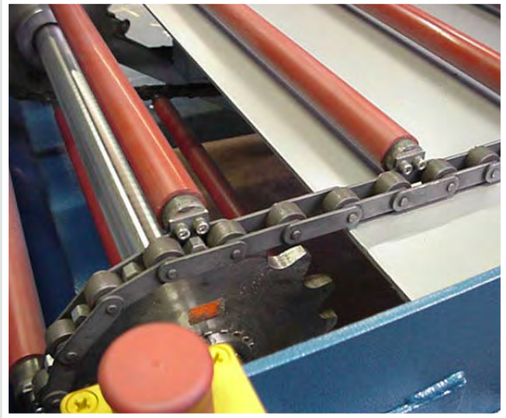
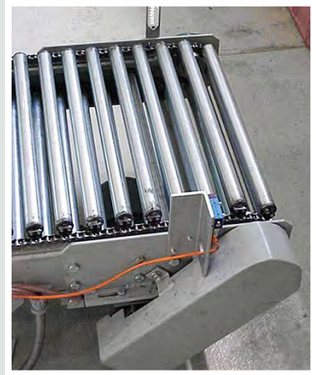
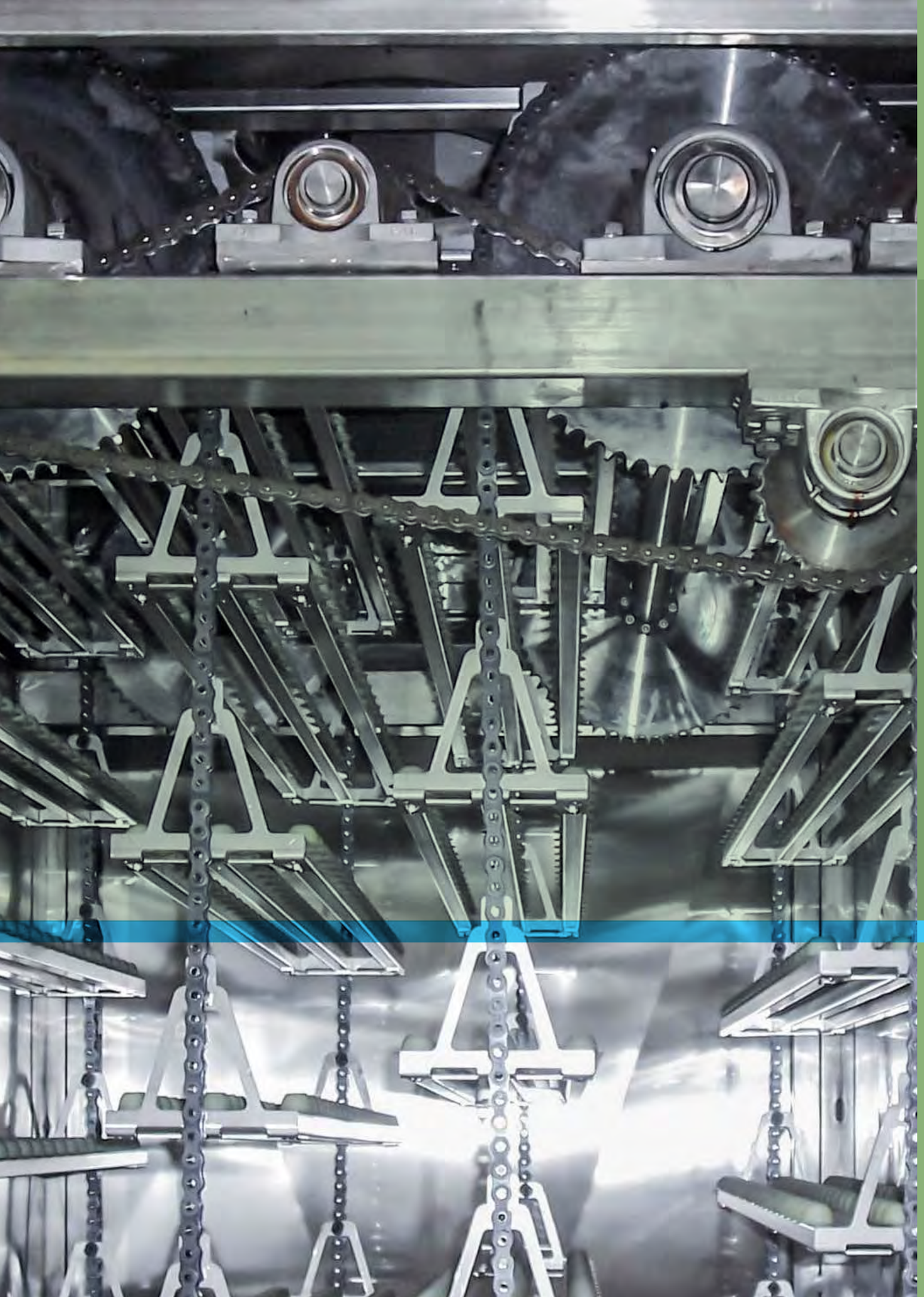


Right:
Chain conveyor with round stainless steel cross struts

Left:
Wire mesh belt





Paternoster furnaces

Customised furnace sizes | Individual charging solutions

Integration into the flow of goods by means of suitable automation

DIN EN 1539 for solvents | stainless steel inside/outside

Cooling function

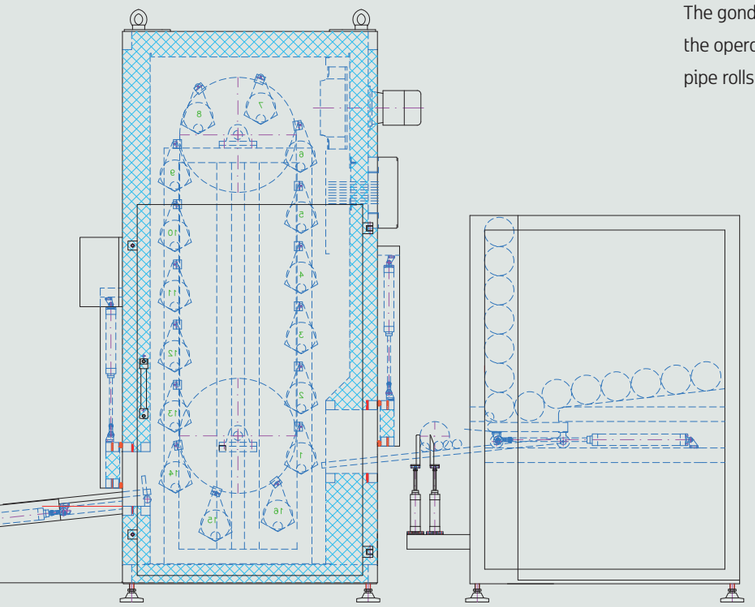
Paternoster furnaces

Furnace systems in paternoster design are used when there is little floor space available for the construction of a furnace. Paternoster furnaces are built upwards and therefore represent a space-saving alternative and are designed as gondola paternosters or tray paternosters. In the gondola design, the means of transport remain mounted on a chain in the furnace system. In the tray paternoster design, the workpiece tray can be moved out of the furnace system. A direct connection, e.g. to a cooling section, is possible.

Gondola paternoster for tempering pipes

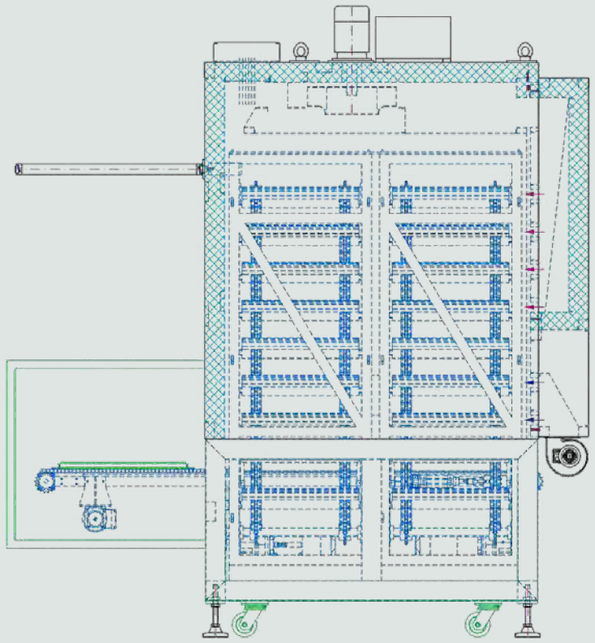
The furnace system is designed for tempering plastic pipes. The pipes to be tempered are automatically fed into the furnace by a separator, cycled through and offered to an employee at the batch exit for further manual processing.

The gondola is unloaded after the cycle time has elapsed and the operator has given the go-ahead. The door opens and the pipe rolls out.



Paternoster furnace for drying components

The pallet or tray paternoster furnace is an integral part of a production process for drying and preheating components for subsequent coating in the injection moulding process. The complete trays are loaded manually.



Multi-chamber paternoster furnace

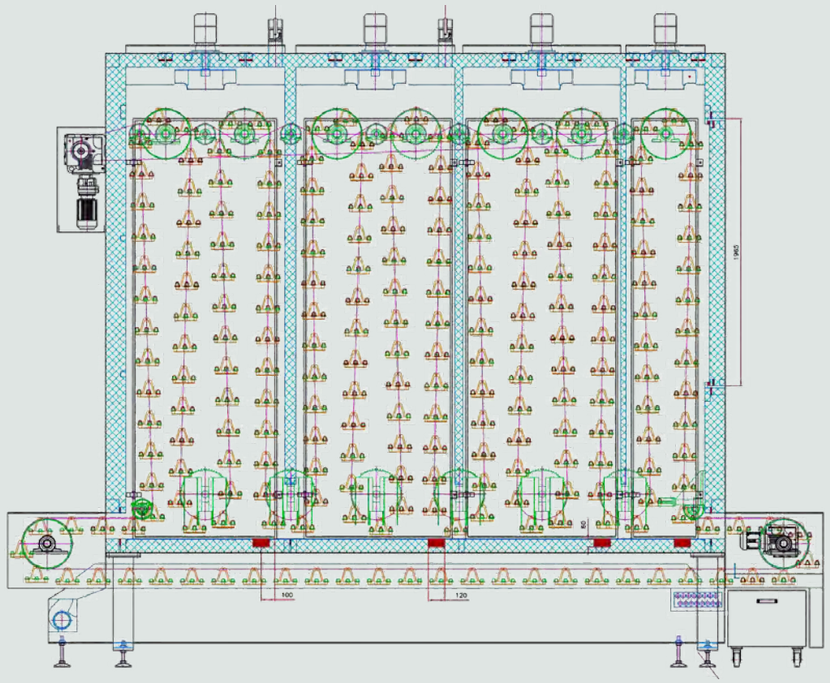
These gondola paternoster systems are fully integrated into an automation system. 18 furnaces run 24/7 with only one one-week maintenance interruption per year. Silicone is tempered in the system.

The process engineering design of the fresh and exhaust air system to ensure silicone cross-linking is important here. The central design task was to design a mechanical system that is resistant to continuous operation.

The system is a gondola system with multiple meanders. This achieves a long dwell time in the system and is also used for tempering zone separation due to the spatial structure.

The cycle time per gondola (60 parts each) is approx. 2.8 seconds.

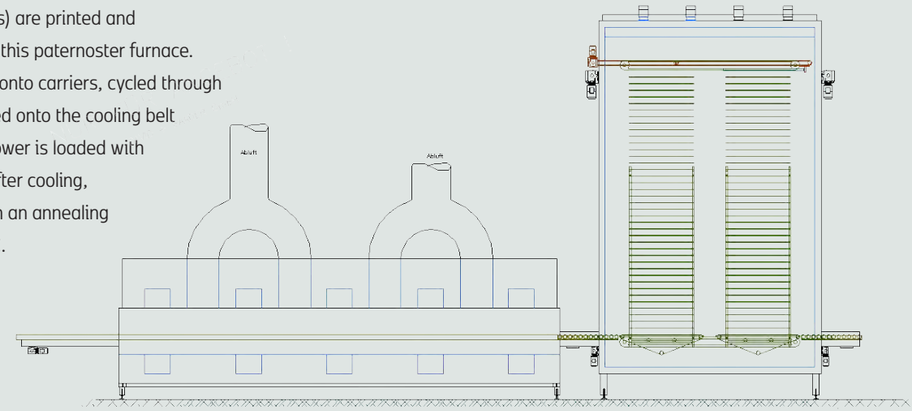
The system is loaded and components are removed by industrial robots.



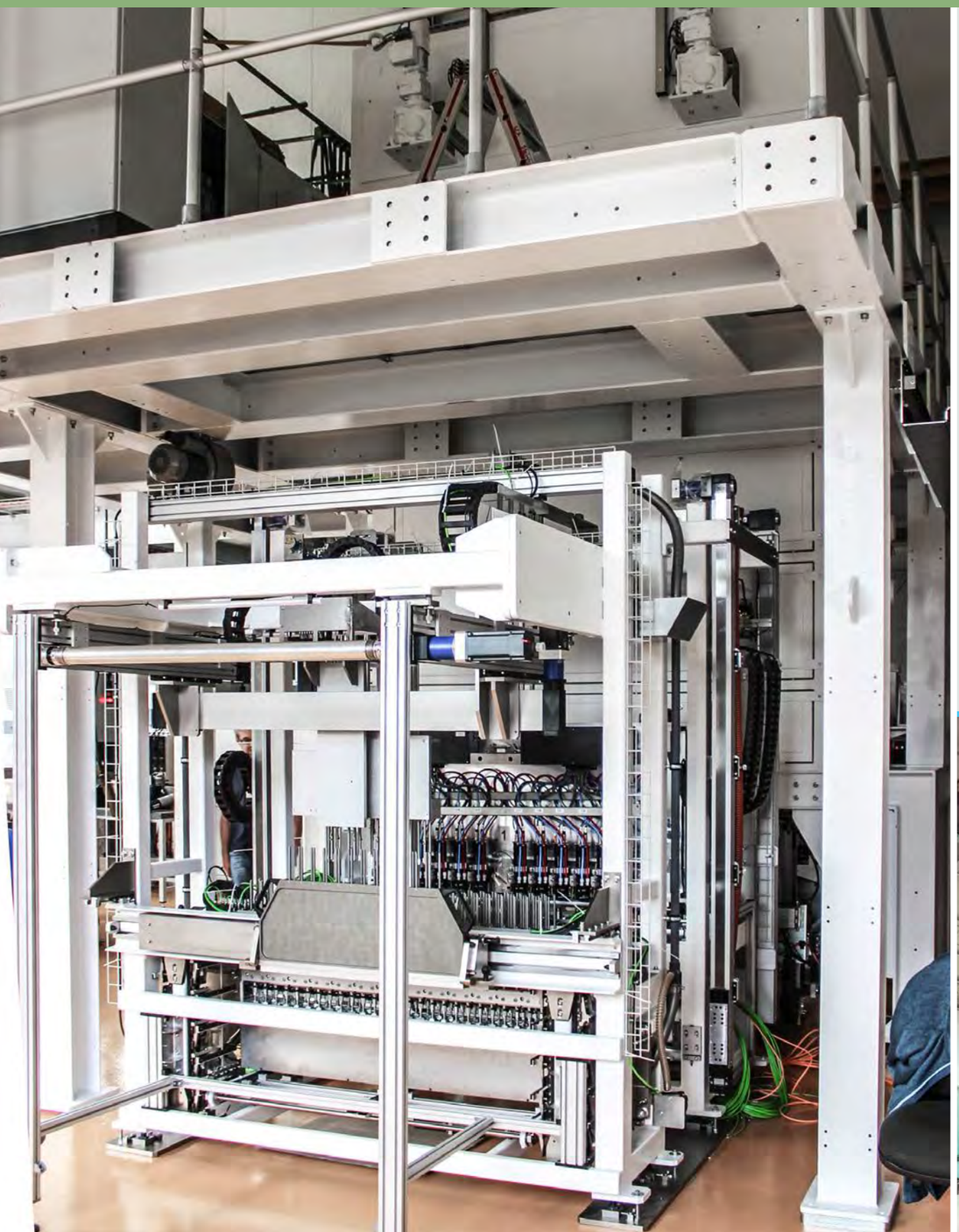
Paternoster furnaces

Paternoster furnace with cooling section

IGlass plates (ceramic hobs) are printed and pre-tempered at 230 °C in this paternoster furnace. The plates are transferred onto carriers, cycled through the furnace and then moved onto the cooling belt at the furnace exit. Each tower is loaded with 2 tonnes of glass plates. After cooling, the glass plates are fired in an annealing furnace at approx. 1300 °C.



Paternoster furnaces

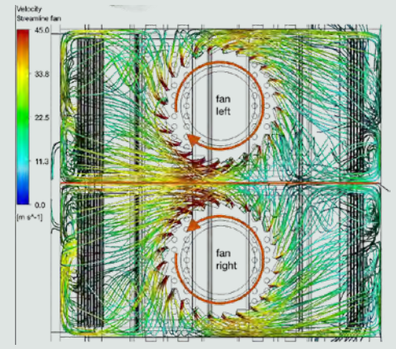


Rack paternoster furnace for tempering silicone

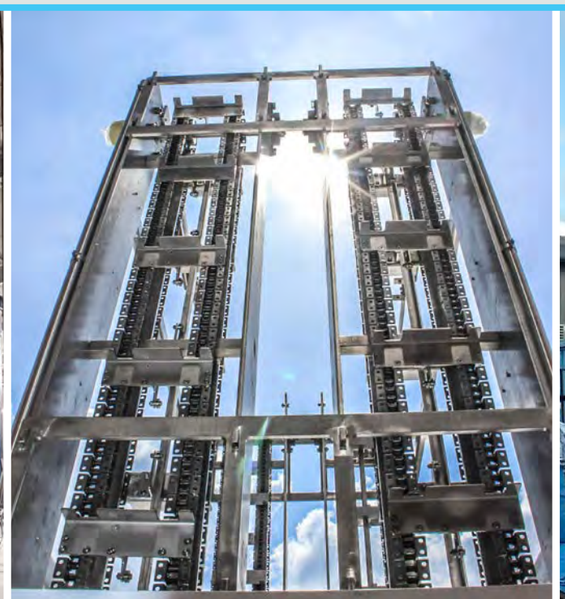
This tray paternoster system is used to heat up and then cool down the batch. Silicone components are tempered. The system runs in continuous operation 24/7.

The externally stacked packs of 10 trays are placed fully automatically at the bottom of the furnace. The system cycle time is 40 seconds. There are 100 components on each stack of trays. Due to the number of cycles (12), the components remain in the heating zone at 130 °C for 8 minutes and then in the cooling zone for 2 minutes.

Extensive calculations and simulations were used to design the air flow to the product, that optimum temperature control is guaranteed despite the extremely short cycle times.



The system is integrated into the layout of the automated feeding and removal system. Access to the upper part of the system is provided by a working platform.



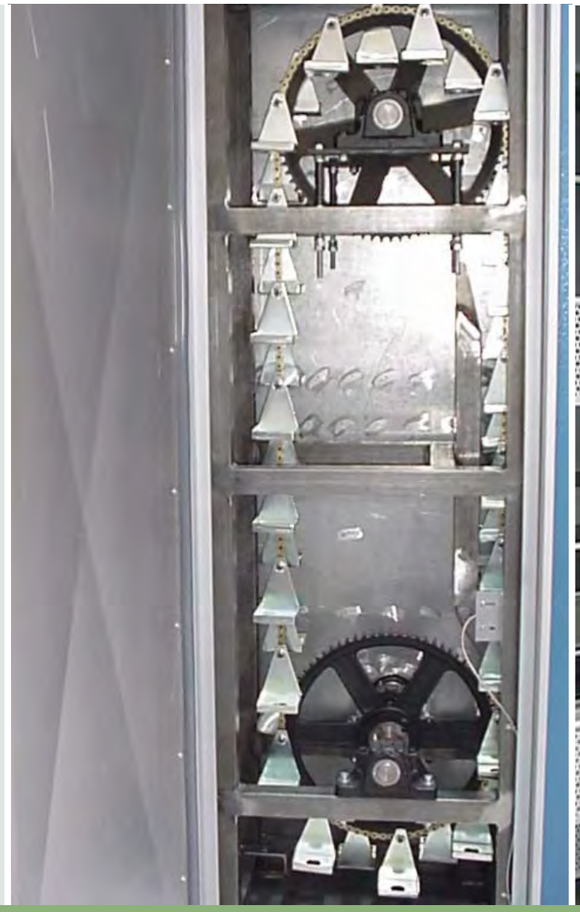
Paternoster furnace

with small gondolas

Even on a footprint of just W 800 x D 1000 mm, a small paternoster system can solve a tempering problem. Incremental encoders are “aged” in this furnace system in order to check them for tolerances afterwards.

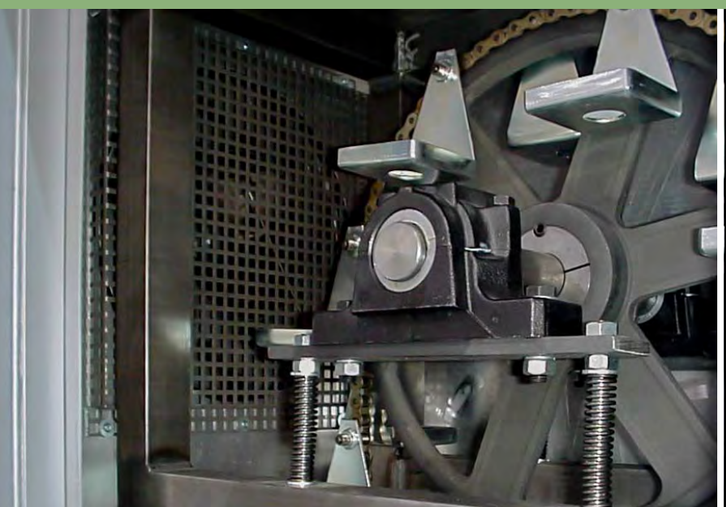
With its 40 gondolas, the desired dwell time of 60 minutes can be realised. Loading/unloading is done manually.

Access is secured by light grids. The FIFO principle, semi-automation and low space requirements were the criteria for using the paternoster.



Paternoster furnace

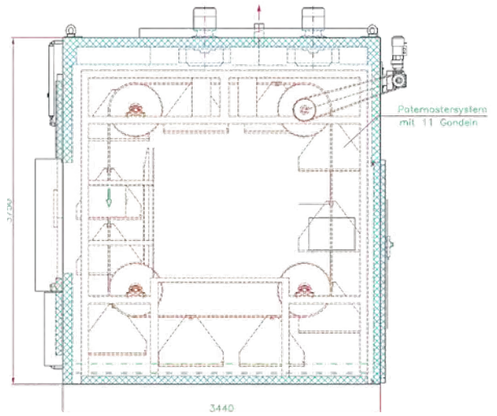
with large gondolas



The photos show a gondola paternoster with relatively large gondolas. The gondola spacing is reduced at the input/output position in order to keep the handling height relatively uniform.

This system is fed manually and is used to preheat dashboard coatings.

Systems of this type can be supplied in different variants, with a single circulation or with a meander circulation.



Turntable furnaces

Customised furnace sizes | Individual charging solutions

Integration into the flow of goods by means of suitable automation

DIN EN 1539 for solvents | stainless steel inside/outside

Cooling function

Turntable furnace

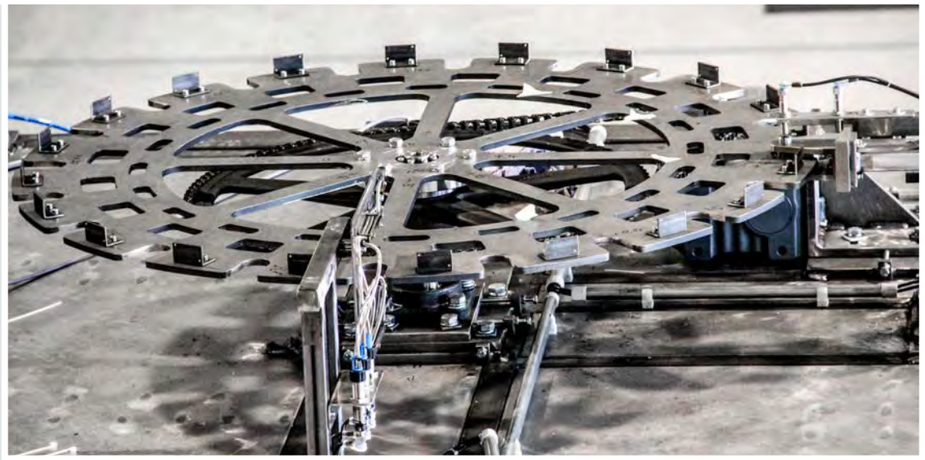
KT 700

Turntable furnace with a total of 12 compartments on two levels for application temperatures between 150 - 180 °C.

The furnace is equipped with two furnace doors, a large manual swing door for maintenance and repair with manual tension locks and two small pneumatically driven lift doors, each opening upwards and downwards for the actual operation of the furnace.

Turntable furnace

12 levels



In this turntable furnace, rings are placed in the furnace at 6-second intervals. The furnace has 12 levels and 20 sub-steps/revolution, i.e. 240 component positions. Each position is clearly identifiable via the pitch circle and the RFID memory mounted on it.

The positioning accuracy in the rotary axis and the 12 levels corresponds to the required robot accuracy.

Turntable furnace

Turntable furnace
for heating PTFE components

This rotary disc furnace is loaded and unloaded manually. PTFE components are heated before being moulded. The turntable unit has two levels and a nominal 16 places on each level. The arrangement is flexible and can be changed at any time. The system is not mechanically linked, but uses a servomotor so that the step angle can be changed via the software (on the control panel) - depending on the part dimensions.

Turntable furnace for paint drying

Turntable furnace for drying lacquer on Windings. Automatic loading and unloading by an industrial robot.

Drawer furnaces

Customised furnace sizes | Individual charging solutions
DIN EN 1539 for solvents | stainless steel inside/outside
Cooling function

Drawer furnaces

Overview

For flat, horizontal materials, drawer furnaces can offer an ergonomic and space-saving solution. Drawer furnaces offer space for a large number of components in a small area.

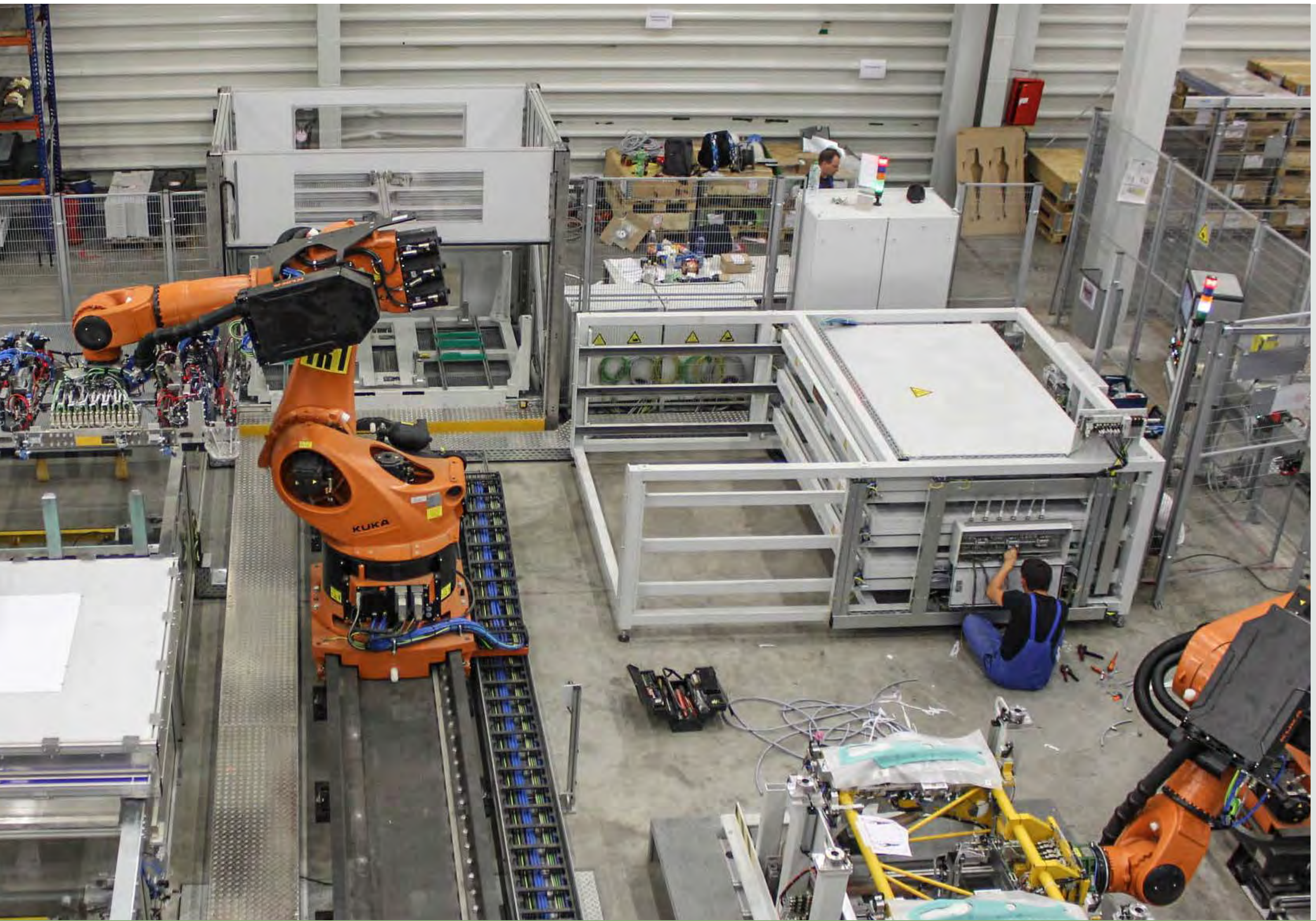
Constant dwell times and FIFO principles can be implemented using time functions, lights or even blocks. This prevents the introduction of un-tempered parts into the subsequent process step. It is also possible to automate the loading and unloading of the drawers.

Drawer furnaces are supplied in different designs. In the best-known design, each drawer has a front panel. Other versions have an furnace door with drawers behind it.

6 tempering and drying furnaces, each with double-leaf doors for independent time sequences with common heating and circulating air. With pull-out loading shelf for easy loading.

Drawer furnace

with automated loading

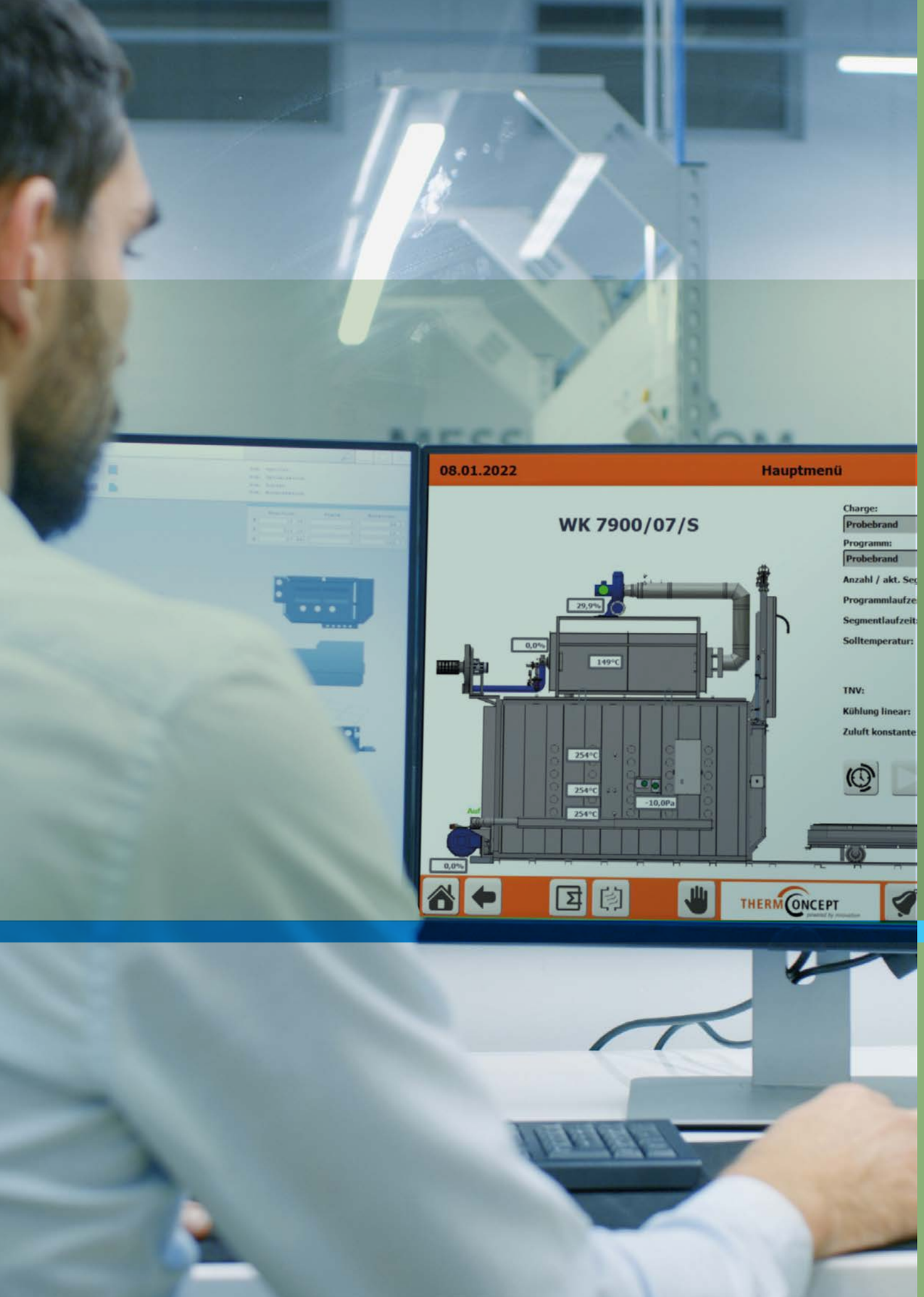


The furnace system has three drawers. Loading and unloading of the pre-pregs is automated. The loading robot is equipped with a special vacuum gripper. The drawers open automatically.

Drawer furnaces

The furnace systems shown here are used for internal transport between two production stations. At pre-production stations, components are first dried at 90 °C and preheated. After filling, the furnaces are then moved to a further processing station. In the second production step, the preheated components are removed from the furnaces, coated and placed back in the furnaces for post-heating. Using the furnaces for internal transport between the production stations offers optimum flexibility in the customer layout.

Drawer furnace for tempering skis



Process control & Process standards

Process control and data-logging

Programm-Controller

THERMCONCEPT furnaces are equipped with control technology tailored to the application and furnace as standard. Controllers from renowned manufacturers ensure extremely precise control of the processes. If necessary, the control technology can be expanded to include appropriate software for programming, monitoring and analysing the processes. PLC controls with touch panels are also available as user interfaces. Our tried-and-tested standard systems can also be supplied in accordance with factory standards and equipment specifications.

Heating element control

Contactors

- Practice-oriented switching frequencies, sufficient for many processes
- Cost-effective and efficient solution

Solid state relay (SSR)

- High switching frequency and thus fast response time for temperature control
- Wear-free and quiet
- Inexpensive solution for higher demands on control and temperature accuracy
- Heating circuit monitoring with notification of defective heating elements as an option

Thyristors (phase angle control)

- Extremely precise temperature control
- Also wear-free and quiet
- Constant mains load, no mains fluctuations, protection of heating elements
- Heating circuit monitoring with notification of defective heating elements as an option

Furnace temperature control

Furnace chamber control 1

- Measurement at a mechanically protected position in the furnace chamber, which experience has shown to be a good average value for the control

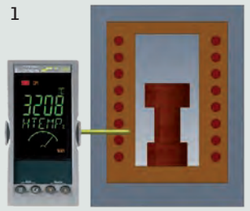
Furnace chamber control with batch measurement 2

- Independent display of the measured temperatures
- For manual checking of the programmed temperature values
- No influence on the regulation

Batch control (cascade) 3

- Temperature measurement and control in the furnace chamber and directly at the batch
- Display of both temperatures
- Very precise temperature control through continuous balancing of furnace chamber and batch temperature

1



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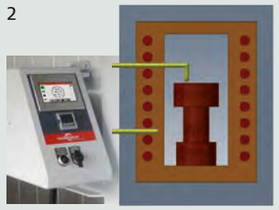

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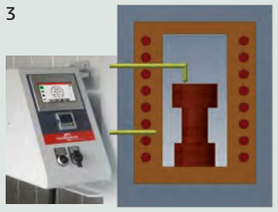


Eurotherm 3208/3216

- 1 program with 8 segments (4 ramps and 4 hold times)
- 1 extra function
- RS 485 interface and iTools software as option
- Multi-zone control optional

Eurotherm 3216i/32h8i

- Can be used as temperature limiter or adjustable temperature selection limiter
- Alarm message as plain text
- Can also be used as a permanently mounted temperature display, optionally also with interface for documentation via iTools software

Eurotherm Nanodac

- Can be used as a program controller/recorder combination for multi-zone or cascade control
- Clear colour display
- Freely programmable as a program controller with 100 programs with 25 segments each
- 4 thermocouple inputs freely configurable
- USB port for removable media, integrated flash memory
- Ethernet interface
- Incl. software for programming, control and documentation

Programme controller

Control and data-logging

THERMCONCEPT PID controller TCP 400 with 4.3” and TCP 1000 with 10” touch panel

- 200 programmes with 24 segments each
- PID programme controller with input via touch panel
- Precise temperature control, self-optimisation
- Clear and intuitive operation largely language-neutral via pictograms
- Up to 5 programme-controlled event functions / control contacts possible
- Resistive touch screen, operation also possible with gloves
- Programmes can be individually named with plain text
- Display of up to 3 operating states (depending on the furnace version)
- Graphical view of the programme progress
- Language selection (DEU, GBR, FRA, CZE, CHN, NED, ES, PT, IT)
- Alarm messages in plain text
- Real-time display with date and timer for up to 20 days lead time
- History display of the last 48 h on the display
- USB interface for reading out data history on USB stick integrated (plug-in socket optional)
- Ethernet interface for connection to a PC with corresponding software integrated (plug-in socket optional)
- Excel script for simple graphical evaluation of the measurement data
- Holdback for guaranteed warm-up time

Optional

- Module for cascade control:
  Programme controller with furnace chamber and batch temperature control with 1 thermocouple each, switchable between furnace chamber and batch control for optimum temperature control in each case
- Multi-zone control module: For precise temperature control over multiple heating zones in the furnace chamber.
- Webviewer to monitor and operate the furnace via mobile phone or computer
- Temperature controller with 7-day preselection clock for programmable switching between day and night temperature, especially for furnaces in shift and continuous operation

Control

THERMCONCEPT uses the Siemens PLC S7 to control complex processes and programme sequences, taking into account any necessary safety devcies.These are created and optimised individually and specifically for the respective application in close cooperation with the user.

Siemens SPS S7 control/operator interfaces

- Customised and programmed for the furnace and process
- Customised, individual user interfaces as an option
- Optimal solution for systems with a wide range of functions and high process reliability
- Detailed process messages with full text output (multilingual)
- Simple tabular programme input via touch panel
- Clear colour display

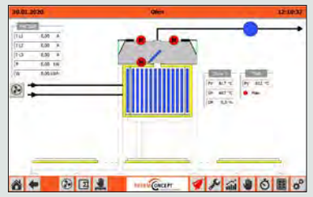
Data-logging

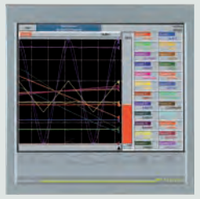
The documentation of all process-relevant data plays an important role as proof of compliance with heat treatment regulations and for quality assurance. THERMCONCEPT offers a range of options for this purpose:

- Eurotherm iTools and Eurotherm controllers with connection to a PC for programming, monitoring and documentation
- Digital recorders with up to 18 channels, USB interfaces, Ethernet, memory cards
- Process standard compliant recorders such as Eurotherm Aerodac 6100A, 6180A, 6100XIO, Nanodac

Control and evaluation software:

- Eurotherm iTools for professional process control and documentation of temperature-time profiles and batch data
- Multiple furnaces can be managed simultaneously
- Control from a central PC or via a Network
- Great operating comfort





International Aerospace material standard AMS 2750 G

This standard covers requirements for temperature measurement in heat treatment systems in the aerospace industry and concerns furnaces and systems as well as their thermocouples, temperature controllers and displays. The documentation of heat treatment processes as well as regular system accuracy tests and temperature uniformity tests play an important role in quality assurance and are carried out to ensure that components have been heat treated in accordance with the applicable standards.

The heat treatment systems are categorised into furnace classes (temperature distribution in the working chamber) and instrumentation versions (pyrometry design).

Temperaturverteilung

Furnace class 1+/- 3 °C	Furnace class 4+/- 10 °C
Furnace class 2+/- 6 °C	Furnace class 5+/- 14 °C
Furnace class 3+/- 8 °C	Furnace class 6+/- 28 °C

Instrumentation version Thermocouples per zone	A	B	C	D+	D	E
Regulation	X	X	X	X	X	X
Recording	X	X	X	X	X	
Hot & Cold	X		X			
Component / Sample	X	X				
Additional data acquisition				X		
Over-temperature	X	X	X	X	X	

EN 1539

Low-temperature furnaces and cabinets for drying and heating coatings, paints and resins in production, laboratories or technical centres, in which flammable and combustible substances, e.g. solvents, are released during the temperature process, must comply with EN 1539 and be equipped with suitable safety devices, as a flammable gas mixture may arises during the process.

THERMCONCEPT offers an optional EN 1539-compliant version for many models. The furnace is designed as a “Type A dryer” for slow evaporation for drying solvent-based coatings.

These versions are designed for a maximum solvent content. A minimum exhaust air volume flow is configured in advance to ensure safe dilution and removal of vaporised solvents.

The heating is only started after a guaranteed pre-purge time has elapsed and the required minimum exhaust air volume flow has been purged.

If the ventilation fails or the required minimum volume flow is not reached during the process, the heating system is switched off.

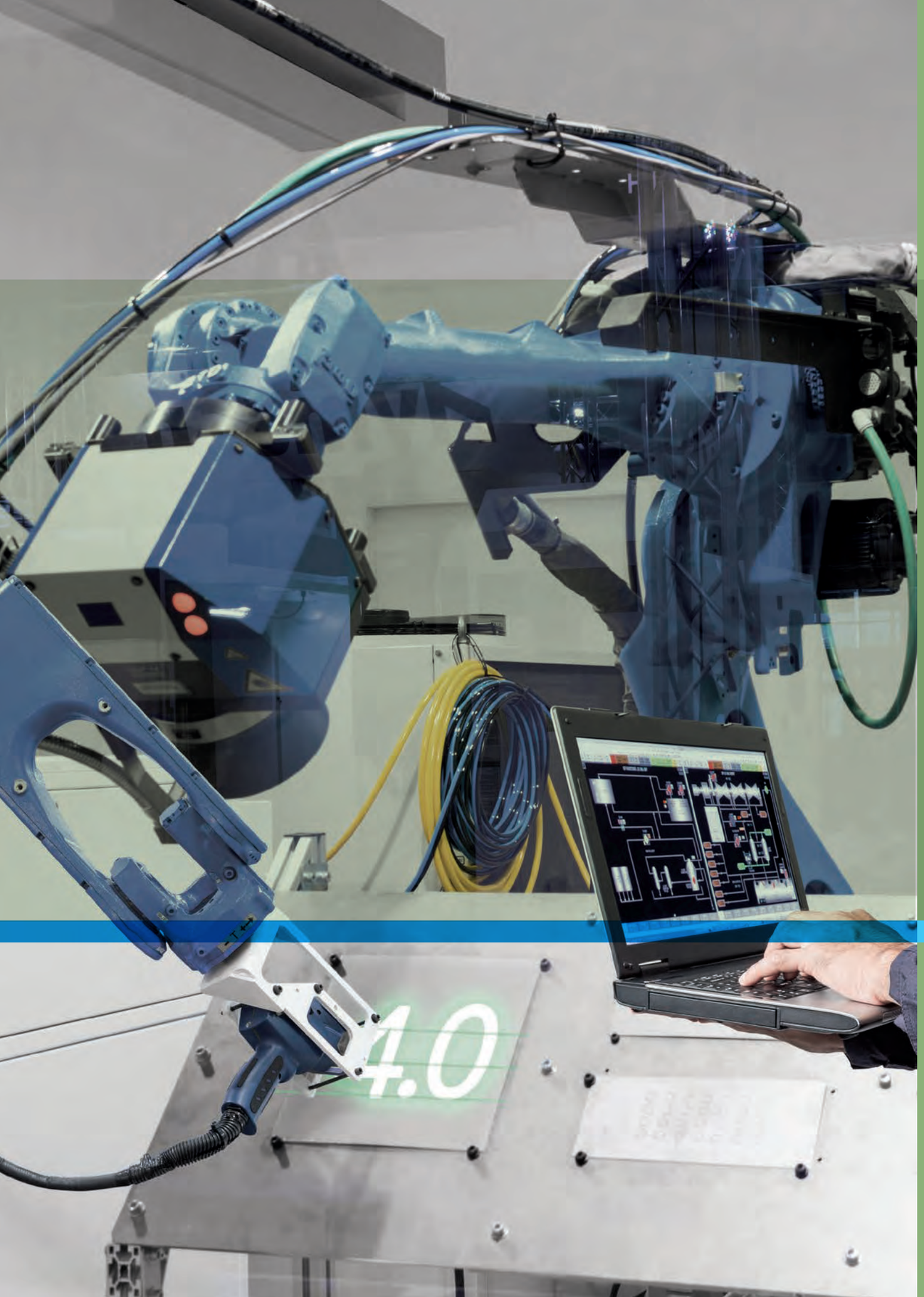
The safety system in accordance with EN 1539 comprises

- a monitored air exchange
- a monitored air circulation system
- a secured pre-rinse time
- an additionally sealed working area

International automotive industry standard CQI-9

The CQI-9 is a self-assessment for the heat treatment of components in the automotive industry and was introduced by a working group of leading international automotive manufacturers and suppliers as well as the International Organisation for Standardisation (ISO) for continuous improvement, error prevention and reduction of process deviations.

Relevant content was taken from AMS 2750 and adapted to heat treatments in the automotive industry with regard to application, requirements, available furnace technology and test frequencies.



Peripheral equipment

Plant automation

Energy efficiency concepts

Plant automation

The need for automation in all areas of industrial production is constantly increasing. THERMCONCEPT complements furnace systems with integrated systems

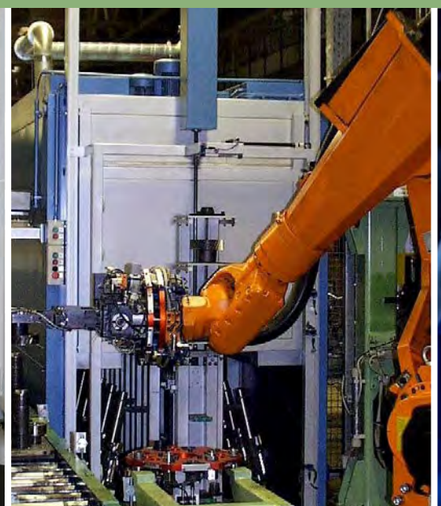
- for loading and placing products on batch carriers, tables and trolleys outside the furnace,
- with systems for direct loading and unloading of an furnace chamber
- for forwarding hot and cold products after the process and

These systems can be controlled manually, run as a function of the temperature process or be fully integrated into the production process.

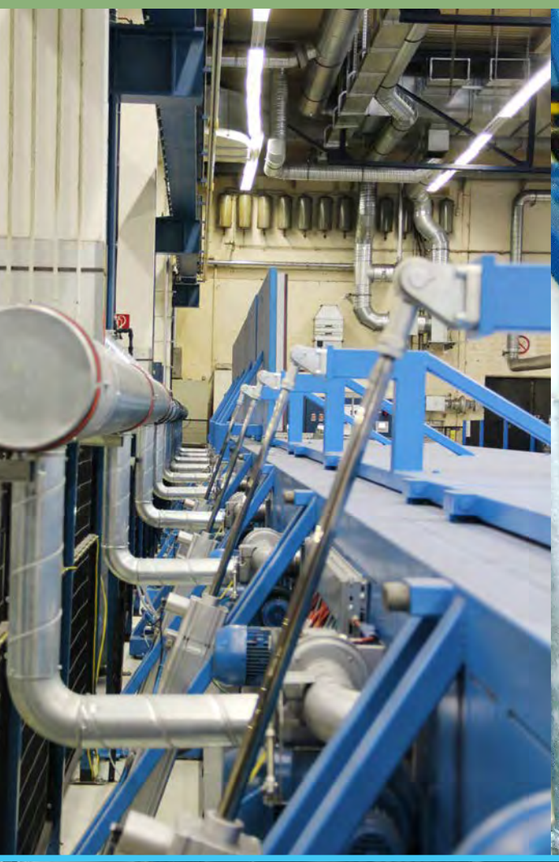
The following systems are used:

- Suspended transport systems
- Roller conveyor
- Automatic cross-shifting devices for rail-bound bogies
- Rail-mounted linear conveyors
- Fully automatic loading and unloading systems based on 6-axis industrial robots

Automation is carried out in close coordination and cooperation with the user and the respective suppliers of individual assemblies.



Energy efficiency concepts



Gas-fired furnace systems in particular generate large amounts of waste heat. The heat potential of the burner exhaust gases can be utilised for downstream processes, thereby improving overall energy efficiency. The economic efficiency of the overall process increases.

The heat recovery of THERMCONCEPT industrial furnace systems takes place via heat exchangers. Air-to-air heat exchangers or air-to-water heat exchangers are used.

THERMCONCEPT supplies intelligent solutions for heat recovery that lead to significant savings in energy costs and also protect the environment.

Energy efficiency concepts

Air-to-air heat exchanger system for 2 continuously operated batch furnaces in which the exhaust air from the respective chamber is used to preheat the other furnace.

- Up to 50 % of the energy from the previous batch can be transferred to the new batch during continuous production with comparable load weights and application temperatures
- The air circulation direction is changed so that the hot air is blown from one chamber into the other chamber. The hot air preheats the new batch and is then blown back. The full power of all fans is utilised to transfer the energy as quickly as possible
- The cycle continues until both chambers have the same temperature
- Once the heat recovery step is complete, one chamber continues to cool down while the other begins the next heat treatment cycle

1. **Start of the cycle and first cycle run**

- New baskets are moved into the right-hand chamber furnace by forklift truck
- Scanning the barcode to enter the batch data into the PLC
- Start of the 1st heating cycle in the right-hand furnace chamber
- In the meantime, new baskets with untreated batches are loaded into the left-hand chamber by forklift truck, and the barcode is scanned to enter the batch data into the PLC

2. **Heat recovery**

- Once the process in the right-hand chamber is complete, energy recycling begins automatically
- The heat energy is transferred from the right to the left chamber
- In this step, the heating in both furnaces is switched off
- This cycle step runs for a predefined time until thermal equilibrium is reached

3. **Completion of heat treatment in the right-hand chamber**

- The heat treatment in the right-hand chamber is complete. At this stage, the finished products still have a temperature of 250 – 300 °C
- The furnace system now offers the following alternatives:

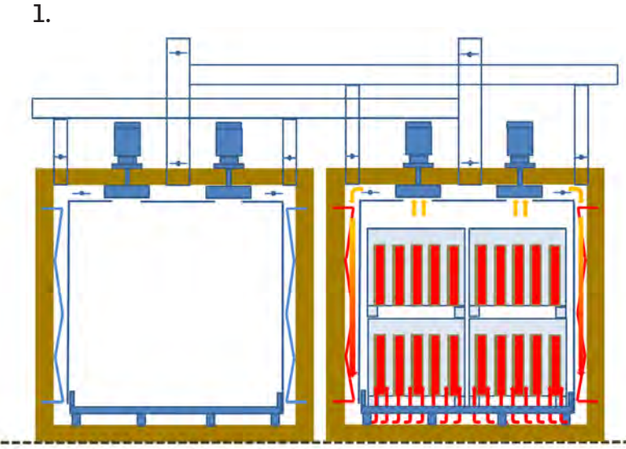
  a) Unloading of the hot batch and direct loading of the untreated crates for optimum energy efficiency

  b) Further cooling of the finished batch before unloading and transport to the next trans-shipment point (lower energy efficiency)

4. **Operation of the next cycle**

- While the heating cycle is running in the left chamber, the right chamber is ready to receive new and untreated crates
- Once the heating cycle in the left chamber is complete, energy recycling from the left to the right chamber begins automatically

1.



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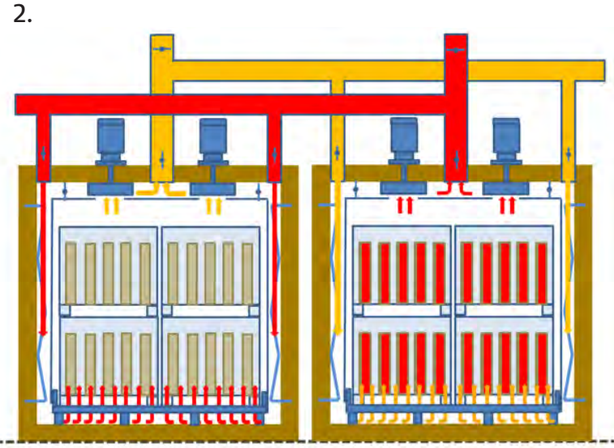

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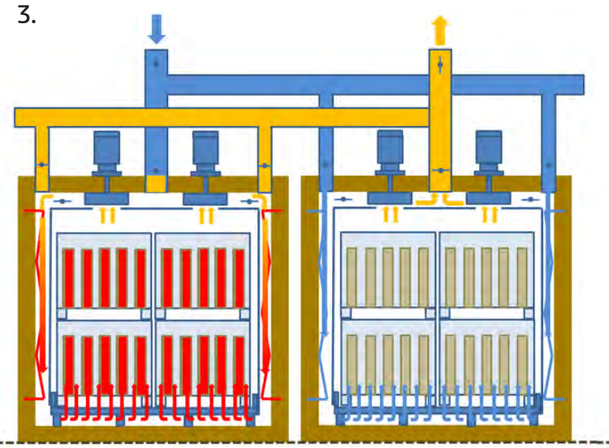

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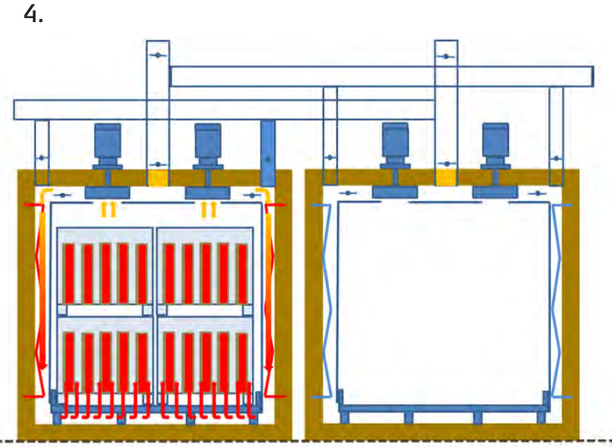

THERMCONCEPT Service

Professional Service

We make your furnace project ours

Success through counselling

You can rely on the experience we have gained over the years in industrial furnace construction. We will turn your special requirements into optimum solutions.

Your application takes centre stage

We support you in selecting the right furnace system so that you make the right investment decision.

Everything from a single source

As a system provider, we not only advise you on the selection of the right furnace system. You can also contact us when it comes to system automation and the use of additional aids, tools and systems.

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Qualified service staff

With our qualified employees, we offer a wide range of professional services for all aspects of the furnace system, for your safety right from the start. Our service technicians are involved in the production process at our headquarters and are therefore always up to date with their knowledge. They are specialists for

- Insulation
- Control and regulation technology
- Heating technology
- Software
- Electrical engineering/electronics
- Mechanics

The holistic support and maintenance of your furnace system is our focus.

Retrofit and standardisation

Furnace systems from THERMCONCEPT are known for their durability. After many years of hard use, they are far from being a thing of the past. We take care of your systems and make them fit for the future. Significant energy savings can often be achieved with little effort. Adaptations to current standards are also possible so that the furnace system can also be used for additional applications and processes. Modern control systems increase operating convenience and expand the possibilities for process documentation.

Fit for Future

What you can expect from us is a comprehensive package of professional services to keep your furnace fit in the future

Furnace inspections

During a furnace inspection, we thoroughly check the condition and functionality of your furnace system. On request, this also includes measuring the temperature uniformity according to DIN 17052-1, SAT, TUS and checking whether your system still complies with the applicable standards. The results are documented in a test report.

summarised in a report. In addition, we provide you with profitability analyses for the necessary retrofit measures.

Preventive maintenance – Predictive maintenance – Life-cycle costing

Unexpected system downtimes cause trouble and considerable follow-up costs. That‘s why we offer you flexible maintenance contracts with regular inspections as well as preventive and cost-effective replacement of critical spare parts. The maintenance work is comprehensively documented and analysed. This is the prerequisite for optimising life cycle costs.

Spare and wear parts: Only the original is first choice

Spare and wear parts from THERMCONCEPT offer you:

- always original equipment quality
- 100 % safe to use and a perfect fit
- maximum service life
- a better price-performance ratio than supposedly cheaper replica parts
- constant availability
- the adoption of product improvements also for spare parts
- responsive logistics

Online monitoring / online support

With online support, we offer our customers an extremely cost-effective service for support, e.g. for programme optimisation, troubleshooting, etc. This often avoids costly on-site visits by service technicians. This means that costly on-site visits by service technicians can often be avoided.

The product range at a glance

CFRP | GFRP

THERMCONCEPT supplies a comprehensive range of low-temperature furnaces and industrial drying systems of various designs for the diverse areas of application for drying and processing composite materials such as CFRP, GFRP, elastomers and silicone. In addition to the classic chamber furnace, drawer furnaces, chest furnaces and furnace systems with removable trolleys are also used. Continuous furnaces with horizontal or vertical transport of the components are available for continuous processes.

Technical ceramics | Bio-ceramics High-end ceramics

THERMCONCEPT furnaces and heat treatment systems are used for many industrial applications in the development and production of technical ceramics. Our chamber furnaces, bogie hearth furnaces and bell-type furnaces are electrically or gas-fired. In addition to a wide range of practical standard models, we also supply furnace systems, system automation and suitable exhaust air purification systems that are specially tailored to your application.

Metal | Industry | Production

Here you will find furnaces, systems and accessories for a wide range of heat treatment applications in the metalworking industry, e.g. in toolmaking. Almost all important heat treatments are covered by our practical range.

Metal | Melting | Holding

The foundry programme includes electrically and fuel-heated melting and holding furnaces for light and heavy metals, which are designed as both bale-out and tilting furnaces. We also supply furnaces for a wide range of heat treatments in the foundry.

Laboratory | Research | Development

Furnaces for research and laboratory applications are available for temperatures from 200 °C to 1800 °C. Our programme includes muffle furnaces, tube furnaces, drying furnaces, elevator furnaces and high-temperature furnaces.

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